INVESTIGATIONS INTO POSSIBLE IMPROVEMENTS IN FINANCIAL PLANNING MODELS THROUGH STRUCTURAL CHANGES

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Scope and Method of Study: This study examines the feasibility of bringing about structural changes in a corporate financial planning model. The structural changes examined relate to the predictions of company sales, dividend payout, and share price. The work described in this report uses historical data for eleven retail firms; a mix of small, medium and large firms is used. The retail industry, in general, is characterized by stable sales and earnings. Therefore, the conclusions drawn in this report may not be applicable to high growth industries, or industries with cyclic sales and earnings patterns.

Findings and Conclusions: Management can bring about structural changes in the corporate financial planning model by adhering to simple normative or prescriptive guidelines in determining the "right" type of models that are best applicable to the firm. For example, sales prediction models for retail firms based on economic indicators such as the GNP are easy to implement, and provide better forecasting methods than extrapolations from historical data. Similarly, the dividend model that assumes the same dividend in a year as in the previous year gives better results than the models assuming a constant payout ratio or a constant increase in dividend. Finally, the stock price models are probably the most difficult to construct because the correlations between per share price, dividend, earnings and the interest rate are not consistent from one firm to another.

ADVISOR'S APPROVAL 

INVESTIGATIONS INTO POSSIBLE IMPROVEMENTS
IN FINANCIAL PLANNING MODELS
THROUGH STRUCTURAL CHANGES

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CHAPTER 1

INTRODUCTION

A corporate financial planning model contains numerous variables such as sales, operating ratios, price to earnings ratios, retention rates, debt to equity ratios, etc. The management provides inputs to the model regarding many of these variables. The output from the model may consist of pro-forma summary balance sheets, income statements, and certain other variables such as earnings per share and share price. The structural changes in a model can be brought about by improving the forecasting capability of one or more of its driving parts that interact to make it run, thereby enhancing the overall prediction from the model.

The structural enhancements envisioned for this study relate to:

(1) Company sales

(2) Dividend payout

(3) Share price

The sales are the driving force in a corporate financial planning model. Should the sales prediction be based on some measure of the predicted industry sales and/or the general economic outlook, or should they be based on an estimated growth rate?

A consideration of the dividend payout is important because it not only affects the financing requirements of the firm but may also have a bearing on its share price (which indirectly affects the ability of the firm to raise equity financing). What policy do the firms adopt regarding dividends? Is the growth in dividends related to the growth in earnings? The answers to these questions require that we examine the data on dividends and earnings for a given firm. Only then can we incorporate an appropriate dividend policy in the financial planning model for that firm.

The stock price is another variable that affects the financial planning of the firm. If external financing is to be used, how much debt versus equity financing would be needed in keeping with the target debt ratio? How many new shares of stock would have to be sold? The answer to the latter question requires that a method of predicting share price be incorporated in the financial planning model.

The above discussion provides a synopsis of the important questions to answer in bringing about structural changes in a corporate financial planning model. The predictive horizon of the model envisioned in this study is one year which qualifies as a medium-range forecasting and planning model according to the definition of Hogarth and Makridakis (1981). It should be pointed out that our purpose here is not to examine the efficacy of medium-range forecasting and

planning models in general. Hogarth and Makridakis (1981) provide an excellent evaluation of this subject. However, it is worth noting that they give little credence to medium-range (three months to two years) and long-range (two years or longer) forecasting and planning.

The work described in this report uses historical data for eleven retail firms. The retail industry, in general, is characterized by relatively stable sales and earnings. Therefore, the conclusions drawn in this report may not be applicable to high growth industries, or industries with cyclic sales and earnings patterns.

CHAPTER 2

SURVEY OF THE LITERATURE

The use of computer-based financial planning models is gaining wide acceptance in the business community. McInnes and Carleton (1982) provide an excellent summary of the types of models that are being used in the field of financial management. According to these authors, "management requires a framework which facilitates the modeling of three components of the problem, namely the demand for funds, the supply of funds, and the criterion by which demand and supply are to be brought into a consistent relationship with one another." To achieve these objectives, the model development in the area of Business Finance has progressed along two lines:

(1) Models that deal with a specific problem of a specific unit in a business organization, e.g., the capital budgeting models, cash management models, etc.

(2) Models that pervade the whole organization and view it as a single unit, e.g., the corporate financial planning models along the lines of those developed by Warren and Shelton (1971) and Francis and Rowell (1978).

It is the latter category of models that is the subject of interest in the present work. This study will focus on how

the structural changes involving linkage of financial planning models with forecasting models may be used to enhance the predictability of these models. McInnes and Carleton (1982) point to the general lack of such linkages in the models examined by them. They report, for example, that "forecasting models had been developed by many companies to assist with such things as projected market demand and sales and input costs. These models, however, were used independently of the financial planning models; for instance, in no case was there a direct interface between the output of the forecasting model and the input to a financial planning model." This should not be construed to mean that attempts have not been made to directly incorporate forecasting parameters, however simple, into the financial planning model. On the contrary, Francis and Rowell (1978) tried to do precisely that by predicting company sales from the industry sales (based on a market share). How can we make some of these structural changes in a financial planning model from our knowledge of the finance theory and/or historical data? This is the type of question we hope to address in this report.

CHAPTER 3

DATA SOURCES

The data for the retail industry was used in this study. The data can be divided into three broad categories: (1) company data, (2) industry data, and (3) national data. The company data on such variables as sales, earnings, dividends, etc., was obtained for eleven retail firms for the years 1966-81 (Appendix 1). The source of company data was the Value Line Investment Survey. A mix of large, medium and small retail companies was chosen. Our definition of large, medium and small is arbitrary. The following cut-offs were used:

Large retail firm	Sales (1981) $>$ 5 b$
Medium retail firm	Sales (1981) $>$ 1 b$ $<$ 5 b$
Small retail firm	Sales (1981) $\leq$ 1 b$

The data for the retail industry sales for the years 1976-81 was also used in the study, but only to a limited extent. We will discuss it further in the next chapter.

The national data on such variables as the gross national product, personal consumption, interest rates, etc., for the years 1966-81 was obtained from the Economic Indicators published by the U. S. Government (Appendix 2). The annual average interest rate on three-month T-bills was taken to be the average interest rate for a year. This is not an

unreasonable assumption since the data was used in conjunction with the average share price of a firm's stock; the stock-holders are influenced by short-term predictions of interest rates and earnings. As discussed earlier, according to Hogarth and Makridakis (1981), the period of three-months does qualify as short-term.

CHAPTER 4

METHODOLOGY

In the following, we briefly discuss the methodology for carrying out structural changes in a financial planning model with regard to sales, dividends and share price. Each of these changes can be viewed as a submodel, the submodel being an integral part of the overall financial planning model.

However, there are models within the submodels that are derived from historical data. Since there are several possible models within a submodel, the criteria used in selecting the best model is based on two quantities; (1) Sum of Squares Error (SSE) and (2) Mean Square Error (MSE). These quantities are defined as:

$$SSE = \sum (X_i - P_i)^2$$

$$MSE = SSE/n$$

where X_i is the actual value of a variable such as sales in a given year and P_i is the predicted value for the variable in the same year. Also n is the number of degrees of freedom which is the number of data points minus the unknown constants in the predictor model that are determined from the data.

The model with a minimum value of SSE or MSE is chosen to be the best of all models considered. However, there is no

guarantee that model selection based on this criteria is necessarily the best one in making future predictions. The predictability of all models generally deteriorates as one goes further out into the future.

Sales Submodel:

There are at least two methods to predict the company sales. One method involves using the company sales as a percent of the retail industry sales (market share). The model of Francis and Rowell (1978) uses this approach to predict company sales. Any type of marketing strategy designed to increase, decrease or maintain that share can be adequately taken into account especially when historical data is available on the effect of various marketing strategies on the market share. The industry sales, of course, can be tied to a national index such as the GNP or the personal consumption. One apparent problem in using market share as a basis for prediction is that it may be very expensive for firms that have a broad product mix because they will require an extensive internal database. It may also make the model cumbersome to use. The second method assumes that no marketing strategy is in place and that the sales are directly tied to the national economy, increasing as the personal consumption increases and vice versa. Therefore, using the data on the company sales, national retail sales of both durable and nondurable goods, personal consumption and the gross national product, a

predictor model can be developed for forecasting company sales.

In the following chapter, we will consider several models of sales prediction based on historical data. For example, one model will assume a time-trend line through sales data. Other models will be based on the relationships between sales and GNP, personal consumption, etc. Finally, we will examine the utility of predicting sales from the market share information, i.e, company share of national retail sales.

Dividend Submodel:

"The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just do not fit together" (Black, 1976). This statement is as true today as it was seven years ago. Modigliani and Miller (1961) showed analytically the irrelevancy of dividend policy with regard to the value of a firm's shares or the return to investors because the higher the dividend, the less the investor receives in capital appreciation. Why then do the firms pay dividends when they have to immediately turn to debt or equity financing to meet their investment goals? Many firms seem to dish out dividends, so to speak, even when there is a net loss in earnings per share. Other firms continue paying constant dividends in current dollars for several years even when earnings increase substantially during these years. The residual theory of dividends states that dividends should

be paid out of leftover earnings. How widespread is the use of this theory?

Gordon (1959 and 1962) suggested that the dividend policy is relevant to the security valuation. Bar-Yosef and Kolodny (1976) also echoed this view by showing that investors do in fact have a net preference for dividends. In light of all the confusion about dividends, how can we incorporate a dividend policy (if there is any) in the corporate financial planning model? Warren and Shelton (1971) and Francis and Rowell (1978) calculate dividend payout on the basis of a fixed retention rate. Is this approach adequate? In the absence of a spelled-out policy of the corporation with regard to dividends, can we make enough sense out of historical data to incorporate a workable submodel of dividends in the financial planning model? These are the type of questions we hope to address in this study. Specifically, we will examine the historical data on earnings and dividends to determine if a particular dividend policy is apparent for the firm under study. In particular, the dividend policies examined will be (a) same dividend as in the previous year, (b) same retention rate as in the previous year, and (c) time-trend line through the historical data on dividends.

Stock Price Submodel:

As noted earlier, the intended purpose of this submodel is to be able to predict the company's share price based on

its performance. This prediction is necessary because it directly affects the ability of the company to raise equity financing at a minimum cost to the shareholders. Unfortunately, the stock prices pose even a bigger puzzle than the dividends. A considerable amount of empirical research has been done in trying to examine the effect of dividends, retained earnings, etc., on the stock prices and the return on stocks for particular industries (e.g. Gordon (1959), Fisher (1961), Blume (1980)). Friend and Puckett (1964) provide an excellent analysis of the relative importance of dividends and retained earnings on the stock prices of industries included in their study. However, none of these studies provides a practical method of predicting the price of a company's share based on its forecasted earnings and/or dividend outlook, and the general outlook of interest rates. In light of the recent performance of the stock market in response to the interest rates and its obsession with the M1 indicator, it is surprising that so little attention has been paid to the interest rates. Part of the reason for this neglect may have been the result of single-year focus on the effect of company variables on the stock prices in a particular industry.

One simple method of including stock price prediction in the financial planning model is to calculate the price by multiplying the price to earnings (PE) ratio for the past year with the expected earnings per share (e.g., Warren and Shelton (1971)). The assumption here is that PE ratio is constant from

one period to the next. Experience shows that this is not the case; the PE ratios declined considerably during the high interest rate environment, and has only recently reversed further decline with an improvement in the interest picture.

Francis and Rowell (1978) used the security valuation model to calculate the value of the firm's stock in their financial planning model. They assume perpetual growth in dividends at a constant rate. The single period valuation model is expressed as:

$$P(T) = (D(T) + P(T+1)) / (1+R)$$

where P(T) is the price that investors are willing to pay for a stock in time period T, D(T) is the expected dividend during this period, P(T+1) is the price that they expect to receive for the stock in period T+1, and R is the discount rate. This model hardly seems to help us in predicting what P(T+1) would be a year from today. The recent surge in stock prices seems to be directly related to the forecasted earnings of the firms and inversely related to the forecasted interest rates. The stock appreciations of recent months seem hardly the result of investors' expectations that significant boosts in dividends are imminent. What are the relationships between stock prices, dividends, earnings and interest rates? These are the kinds of questions we need to answer before we can come up with a model for predicting a firm's stock price based on its projected EPS and the outlook for interest rates. Specifically, we will examine the correlations between stock

prices and dividends, earnings per share and interest rates, and hence, the feasibility of using an empirically derived relationship between stock price and one or more of these variables. We will also look at two simple models: Model I--average share price in a year is the same as in the previous year, and Model II--the P/E ratio in a year is the same as in the previous year.

CHAPTER 5

RESULTS AND DISCUSSION

Sales

Using the historical data for eleven retail firms, the following sales (s) prediction models were developed:

$$s = a + b.\ Year \qquad \text{(Model I)}$$

$$s = a + b.\ GNP \qquad \text{(Model II)}$$

$$s = a + b.\ PC \qquad \text{(Model III)}$$

$$s = a + b.\ D \qquad \text{(Model IV)}$$

$$s = a + b.\ ND \qquad \text{(Model V)}$$

$$s = a + b.\ (D + ND) \qquad \text{(Model VI)}$$

where PC, D and NP are personal consumption, national spending on durable and nondurable goods, respectively; a and b are constants determined from regression analysis.

Model I simply assumes a time-trend line through the historical sales data. Models II-VI attempt to relate sales to national trends which should be conceptually tied to the retail sales. Table I shows the mean square error (MSE) for Models I-VI for the eleven retail firms. It is clear that Model I generally gives a much higher MSE than other models. Overall, Models II and III that relate company sales to GNP and personal consumption respectively, seem to be the best models. Only in three cases out of the eleven does Model I give a lower MSE than Models II and III. Several years ago, Parker and Segura (1971) pointed out that regression relations

TABLE I

MEAN SQUARE ERROR (MSE) FOR SALES MODELS

COMPANY	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V	MODEL VI
ALLIED STORES	13344	5128	5746	9766	6448	5881
CARSON PIRIE	5247	2546	2497	4297	2328	2709
CARTER HAWLEY	59348	9098	9913	21668	11869	10486
FEDERATED STORES	158416	27577	26860	36501	41706	21243
HECK'S INC.	3006	402	403	1158	381	443
K MART CORP.	1675529	106252	100838	342959	195754	85656
MAY STORES	41938	47733*	47032*	51020	51510	46929
J.C. PENNEY	184874	478615*	497105*	257901	614495	466668
SEARS ROEBUCK	4479442	1631402*	1536812*	3524875	1423631	1742672
WOODWARD LOTHROP	151	112	109	106	131	92
F.W. WOOLWORTH	69805	135876	139206	109835	151848	118802

*The constant a=0 for these models.

which employ causality between variables produce better prediction models than straight-line extrapolation of past data. The predictions from Models I-III along with the actual sales are shown graphically in Figures 1-3 for the Federated Department Stores, Inc.

The utility of the models that are based on the national sales of durable and nondurable goods is uncertain unless more data is available regarding a company's actual sales breakdown in these categories. We see from Table I that the MSE for Model VI is comparable to those of Models II and III for all retail firms studied. This result conceptually makes sense; the sum of durable and nondurable goods consumed is probably closely tied to the GNP and PC.

The prediction of company sales from the national retail sales was attempted for three firms of small, medium and large size. The method involves predicting national retail sales from personal consumption. As discussed above, GNP and PC seem to be good predictors of retail sales. National retail sales data for the years 1976-81 was used in developing the model,

$$\text{National Sales} = a + b.\ \text{PC}$$

Table II shows the predictions from this model along with actual sales. The predicted values from Table II were used to predict company sales (s) for a particular year as follows:

$$s = \text{National Sales Prediction} \times \text{Percent Market Share}$$

where,

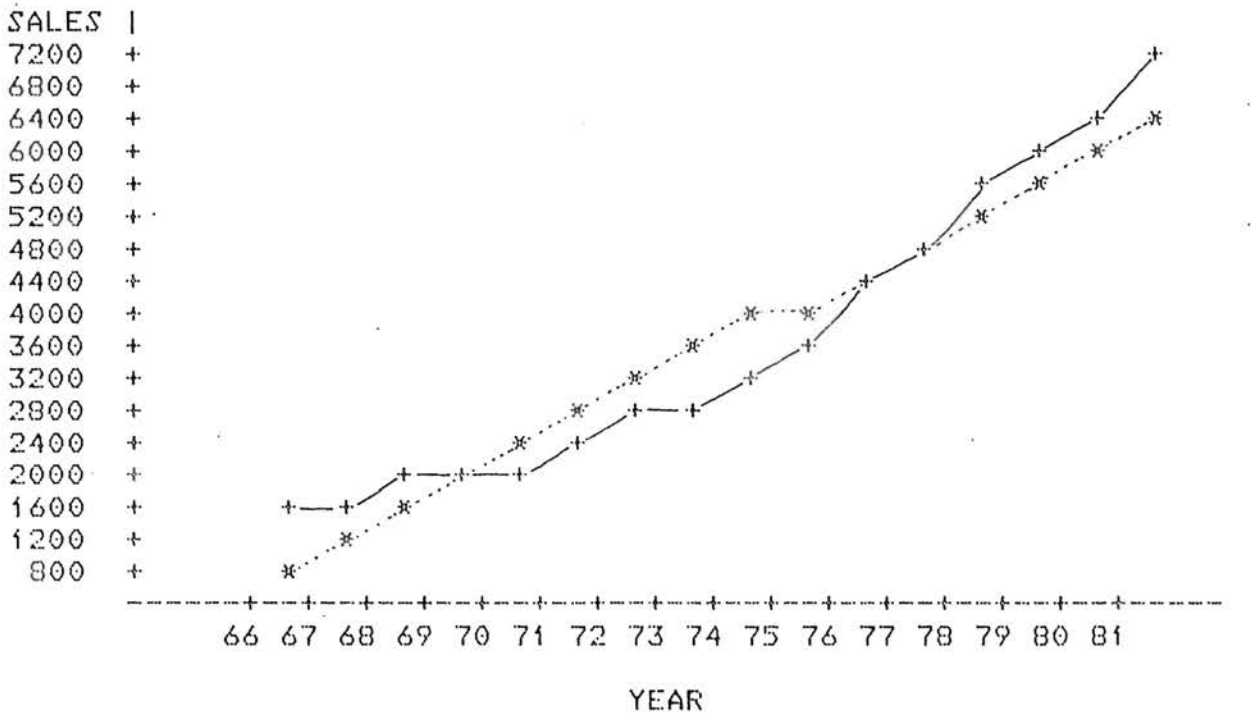

FIGURE 1.

ACTUAL VERSUS PREDICTED SALES (M$)
FOR FEDERATED DEPARTMENT STORES, INC.

+ = ACTUAL SALES * = MODEL I

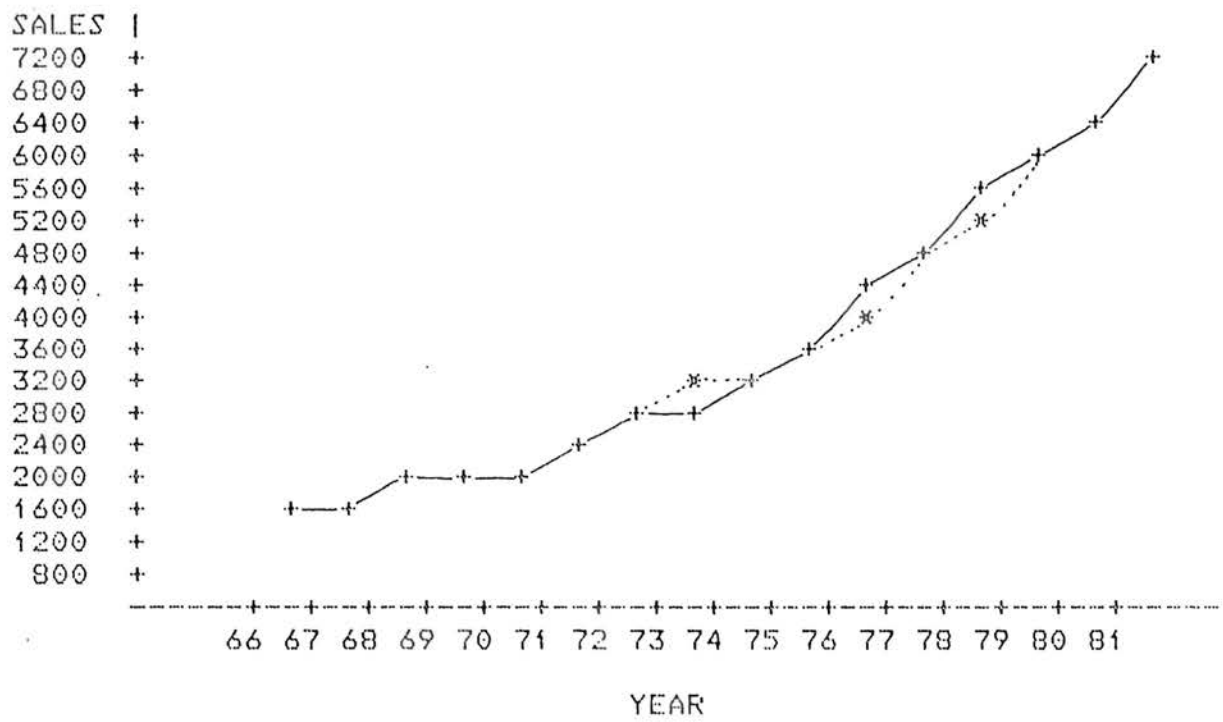

FIGURE 2.

ACTUAL VERSUS PREDICTED SALES (M$)
FOR FEDERATED DEPARTMENT STORES, INC.

+ = ACTUAL SALES * = MODEL II

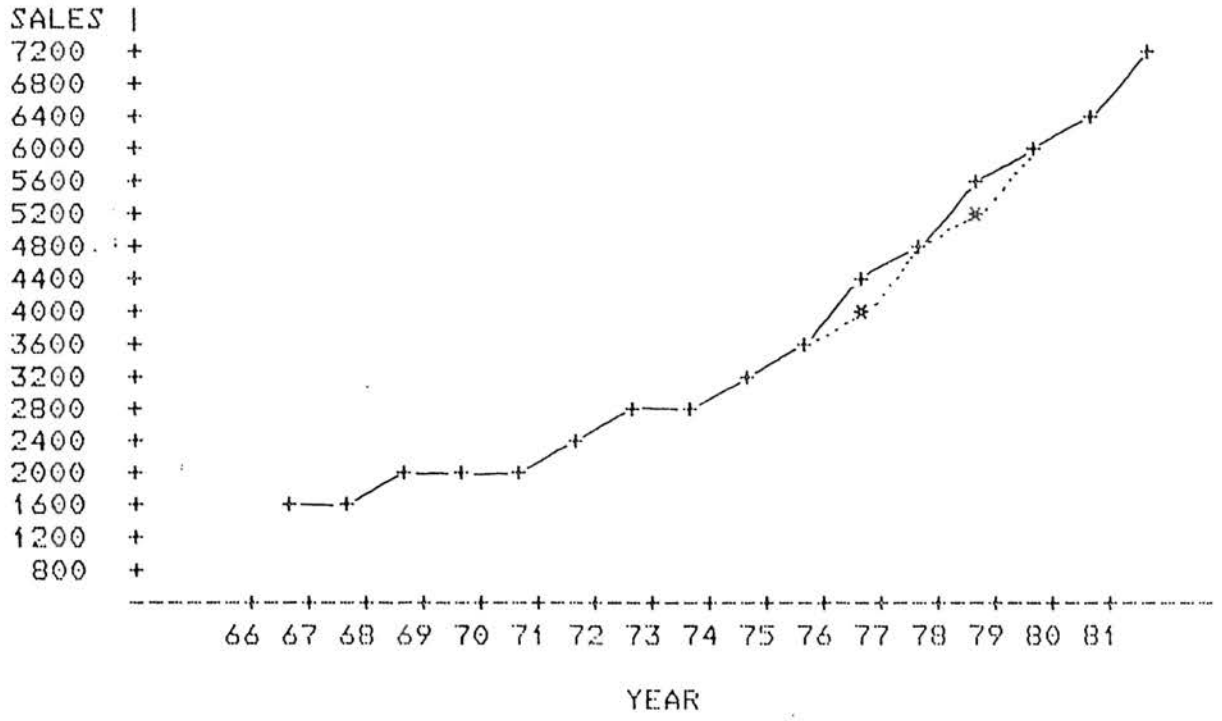

FIGURE 3.

ACTUAL VERSUS PREDICTED SALES (M$)
FOR FEDERATED DEPARTMENT STORES, INC.

+ = ACTUAL SALES * = MODEL III

TABLE II

ACTUAL VERSUS PREDICTED
RETAIL INDUSTRY SALES (M$)

YEAR	ACTUAL	PREDICTED
76	62780	61955
77	70744	68817
78	79574	76936
79	85144	86118
80	94978	95260
81	102697	105317

$$\text{Percent Market Share} = \frac{\text{Actual Company Sales}}{\text{Actual National Sales}} \times 100$$

The results for the three companies are shown in Tables III-V along with the predictions from Model III discussed above. Model III was chosen for this comparison because it is one of the best models of the ones chosen earlier. It is clear from Tables III-V that the predictions based on market share are generally superior to those obtained from Model III, but the prediction assumes that the market share is known exactly. This may be a heavy price to pay for improved sales predictions because it requires a potentially costly information gathering and processing system. In the absence of a marketing strategy designed to affect market share, the cost-effective method of predicting sales seems to be the use of one of the Models I-III. However, if the company embarks on a conscious program that affects market share, then it may be worthwhile to predict sales using the market share and predicted industry sales.

The flowchart in Figure 4 shows the sales submodel. The output from this model becomes the input for the financial planning model.

Finally, a word about the prediction of national indicators such as GNP that are needed to run a sales prediction model. Recent studies (Ahlers and Lakonishok (1983), Makridakis and Winkler (1983)) have shown that the averages of several forecasts give better results than individual forecasts.

TABLE III

ACTUAL VERSUS PREDICTED SALES (M$). FOR ALLIED STORES. PREDICTIONS BASED ON MARKET SHARE AND MODEL III

YEAR	MARKET SHARE(%)	ACTUAL SALES	PREDICTED SALES (MARKET SHARE)	PREDICTED SALES (MODEL III)
76	2.86	1797	1773	1786
77	2.70	1908	1956	1920
78	2.62	2083	2014	2078
79	2.60	2210	2235	2257
80	2.39	2268	2275	2435
81	2.66	2733	2803	2630

TABLE IV

ACTUAL VERSUS PREDICTED SALES (M$) FOR CARSON PIRIE SCOTT & CO. PREDICTIONS BASED ON MARKET SHARE AND MODEL III

YEAR	MARKET SHARE(%)	ACTUAL SALES	PREDICTED SALES (MARKET SHARE)	PREDICTED SALES (MODEL III)
76	0.574	360.5	355.8	390.7
77	0.548	388.0	377.4	429.2
78	0.517	411.6	398.0	474.7
79	0.510	434.3	439.2	526.2
80	0.612	581.7	580.4	577.5
81	0.749	768.9	788.5	633.9

TABLE V

ACTUAL VERSUS PREDICTED SALES (M$) FOR FEDERATED DEPARTMENT STORES. PREDICTIONS BASED ON MARKET SHARE AND MODEL III

YEAR	MARKET SHARE(%)	ACTUAL SALES	PREDICTED SALES (MARKET SHARE)	PREDICTED SALES (MODEL III)
76	7.08	4447	4389	4116
77	6.96	4924	4790	4612
78	6.79	5405	5226	5199
79	6.82	5806	5872	5863
80	6.63	6300	6319	6524
81	6.88	7068	7248	7251

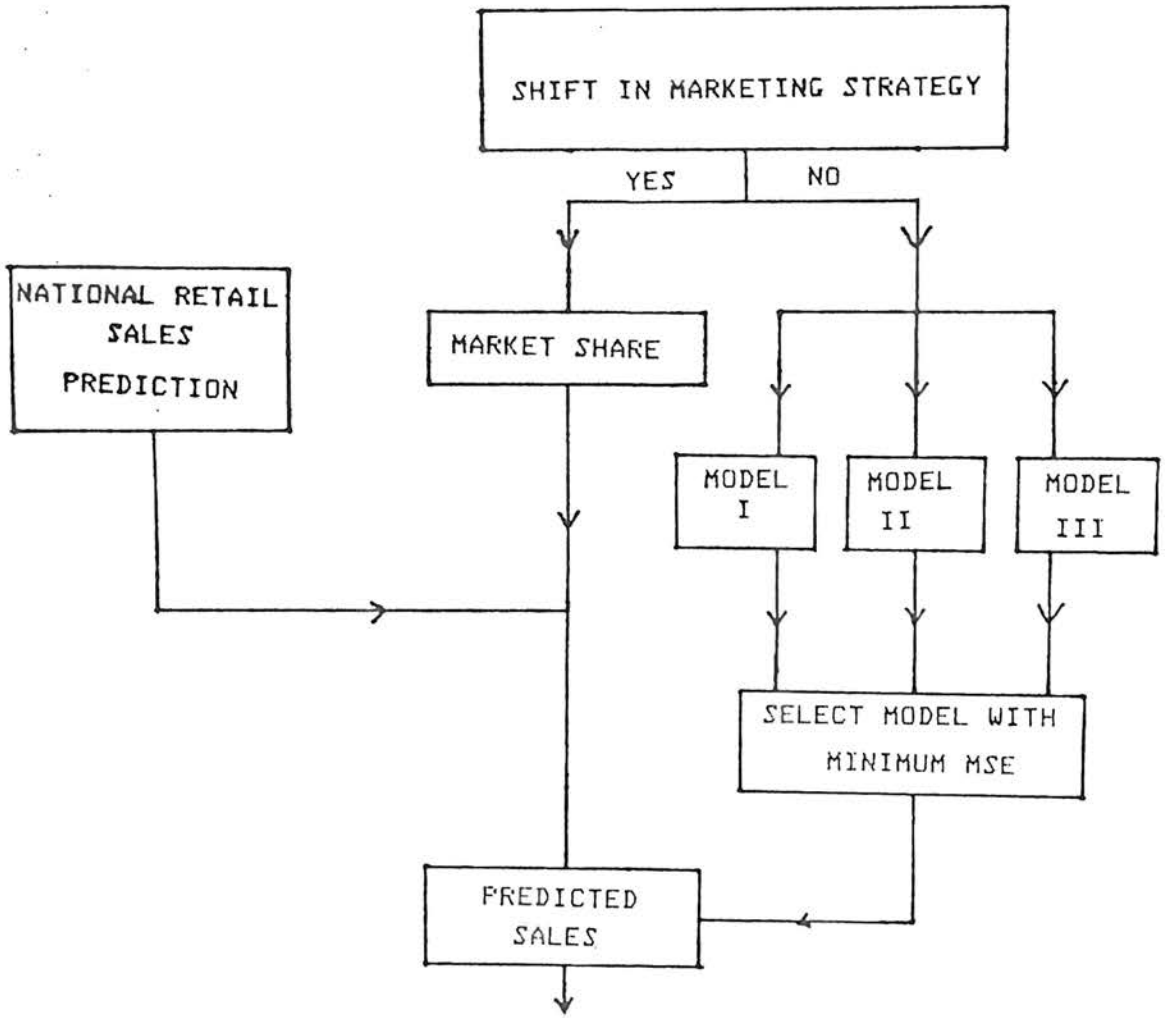

FIGURE 4. (SALES SUBMODEL)

Therefore, our recommendation to a company using national data is to average the forecasts from several different sources.

Dividend

Three models, each concerned with a particular dividend policy, were tested for the eleven retail firms to determine which one of the models best explained the historical dividend payout record of the companies. These models are:

Model I--This model assumes that the dividend (D_t) per share in year t is the same as the dividend (D_{t-1}) in year t-1.

Model II--This model assumes that the dividends to earnings ratio in year t is the same as in the year t-1. Therefore,

$$D_t = (D/E)_{t-1} \cdot E_t$$

where E_t are the earnings per share in year t.

Model III--This model assumes a time-trend line through the historical dividend data, i.e,

$$D = a + b \cdot \text{Year}$$

The sum of squares error (SSE) for Models I-III are shown in Table VI for all eleven firms. It is clear that Model I gives the least SSE, while the SSE for Model II are consistently much larger than Model I and generally larger than Model III. Figures 5-7 graphically show the dividends predicted from these models along with the actual dividends for the Allied Stores

TABLE VI

SUM OF SQUARES ERROR (SSE) FOR DIVIDEND MODELS

COMPANY	MODEL I	MODEL II	MODEL III
ALLIED STORES	0.193	0.535	0.592
CARSON PIRIE	0.163	0.581	0.385
CARTER HAWLEY	0.044	0.338	0.026
FEDERATED STORES	0.105	0.260	0.125
HECK'S INC.	0.008	0.009	0.017
K MART CORP.	0.115	0.222	0.276
MAY STORES	0.070	0.480	0.200
J.C. PENNEY	0.157	2.259	0.221
SEARS ROEBUCK	0.157	0.481	0.109
WOODWARD LOTHROP	0.192	0.645	0.215
F.W. WOOLWORTH	0.145	2.308	0.185

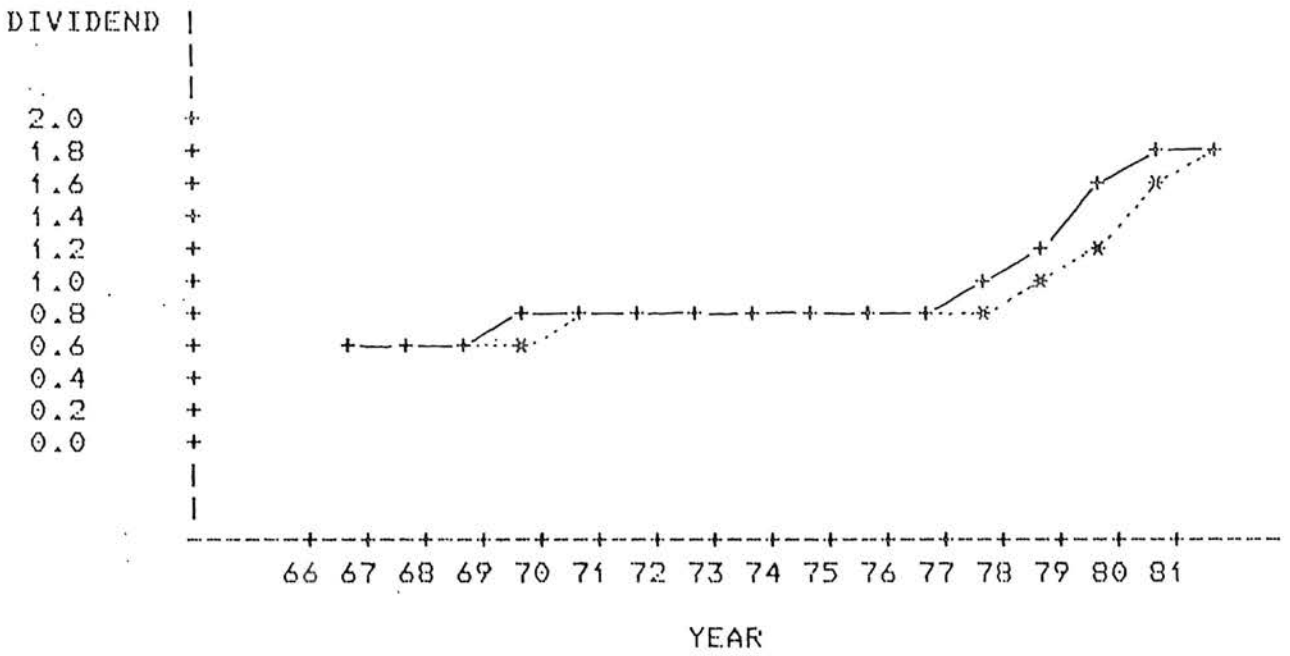

FIGURE 5.

ACTUAL VERSUS PREDICTED DIVIDEND PER SHARE ($)
FOR ALLIED STORES CORPORATION

\+ = ACTUAL DIVIDEND * = MODEL I

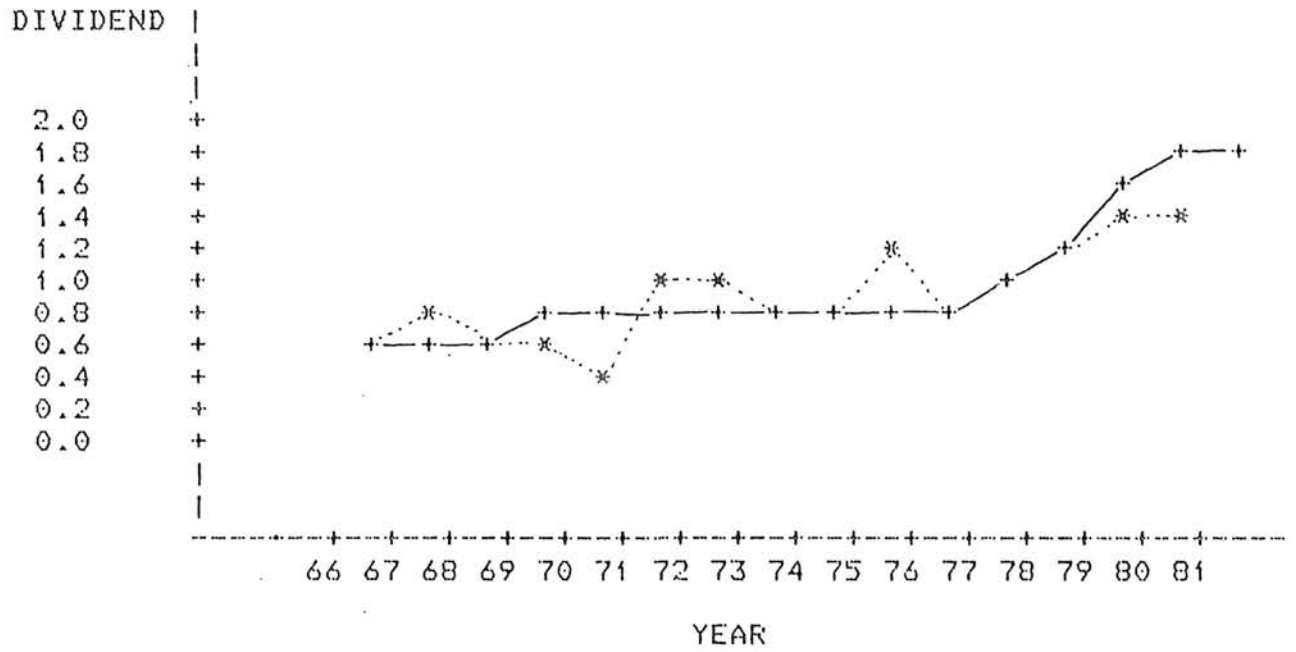

FIGURE 6.

ACTUAL VERSUS PREDICTED DIVIDEND PER SHARE ($)
FOR ALLIED STORES CORPORATION

+ = ACTUAL DIVIDEND * = MODEL II

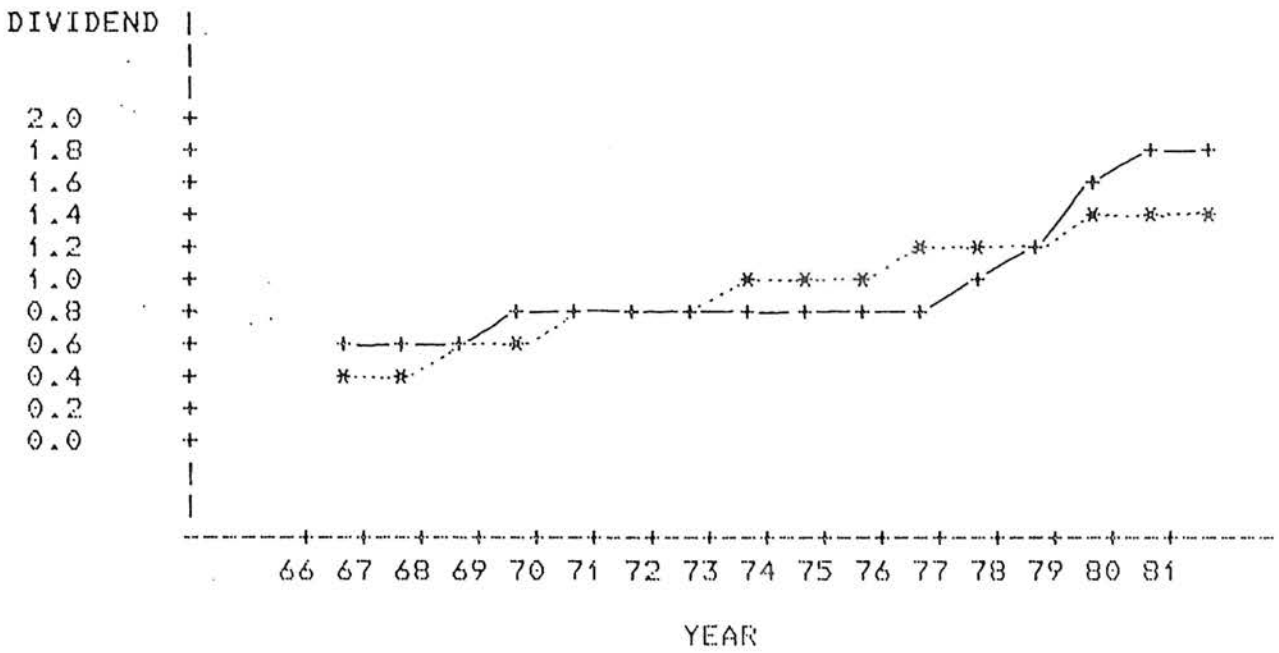

FIGURE 7.

ACTUAL VERSUS PREDICTED DIVIDEND PER SHARE ($)
FOR ALLIED STORES CORPORATION

+ = ACTUAL DIVIDEND * = MODEL III

Corporation. A flowchart of the dividend submodel is shown in Figure 8.

As discussed earlier, the dividend policy (or the lack of it) of firms is a big puzzle. The models discussed above are in no way implied to be all inclusive. Other models might give better results; however, the benefits derived from the model may not justify the cost involved in finding the best model. We should also point out that none of the companies included in our analysis ever reduced the dividend on a share of stock. We are not sure how the results will differ for companies that do not hesitate to cut dividends.

Stock Price

The correlation coefficients between per share price, dividend and earnings, as well as average interest rate for the years 1966-81 are shown in Appendix 3 for the eleven retail firms. There is no logically consistent correlation between the stock price and other variables that emerges from this data. In only three of the companies, the correlation coefficient between P and D is greater than 0.7. The correlation coefficient between P and E is greater than 0.7 in only two of the eleven companies. Contrary to expectations, the stock price of some companies is slightly negatively correlated with the earnings and/or dividend. The only consistent correlations that emerge from this data are those between dividend and interest rate, and between dividend and earnings. Whether there is a causal relationship between dividend and

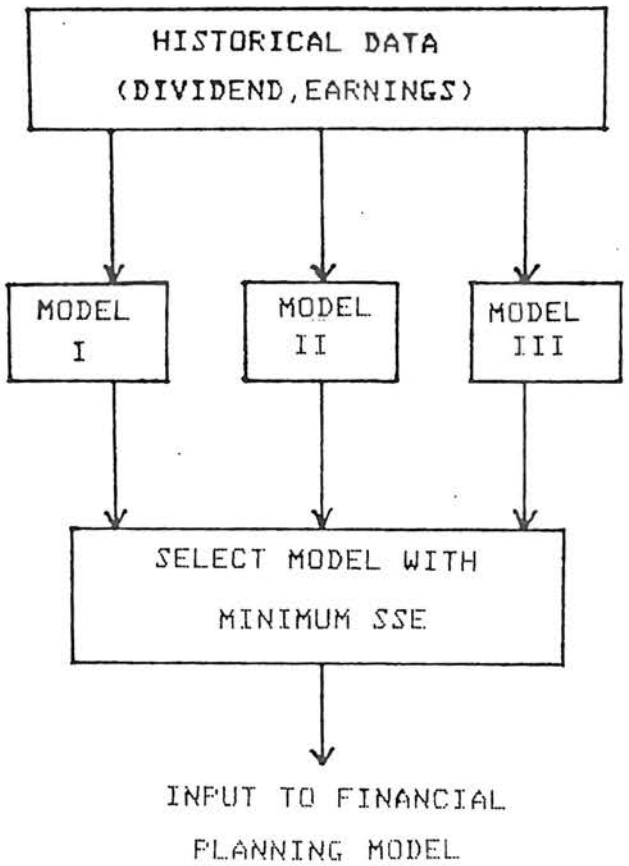

FIGURE 8. (DIVIDEND SUBMODEL)

interest rate is uncertain; we cannot be sure that as the interest rates increased, the companies consciously increased dividends to make their shares more attractive to investors. The correlation between earnings and dividend requires no explanation. There is a general tendency for the companies to increase the dividend as earnings per share rise, but there is no predictable way of determining what the threshold earnings are beyond which an increase in dividend is imminent.

The correlation coefficients between P and other variables show the enormity of the task in deriving a prediction model for a company's stock price. Admittedly, there are other variables that we have not examined. Neither is it possible to examine some of these variables. For example, investor psychology plays a major role in determining stock prices. Also, the effect on P of quantifiable variables such as E and D may not be constant with time; the relative preferences of investors with regard to E and D may change with time.

In keeping with our desire to develop simple predictive models that may be incorporated in a financial planning model, two such models for stock price prediction were tested. Model I assumes that the average stock price (P_t) in year t will be the same as the price (P_{t-1}) in year t-1. Model II assumes that the price to earnings ratio in year t will be the same as in year t-1. Therefore, according to Model II,

$$P_t = (P/E)_{t-1} \cdot E_t$$

Other investigators have used Model II in a corporate financial planning model (e.g., Warren and Shelton (1971)). Our objective here is to determine how this model compares with a yet simpler model which is Model I. The SSE for these models is shown in Table VII for the retail companies included in this study. Both models give comparable values of SSE for most of the firms. Therefore, either of the models can be used in a financial planning model in the absence of something more substantial. The predictions from Models I and II along with the actual stock prices are shown in Figures 9-10 for the Carson Pirie Scott & Co.

TABLE VII

SUM OF SQUARES ERROR (SSE) FOR STOCK PRICE MODELS

COMPANY	MODEL I	MODEL II
ALLIED STORES	254.4	250.9
CARSON PIRIE	133.8	205.1
CARTER HAWLEY	345.7	294.4
FEDERATED STORES	990.8	936.6
HECK'S INC.	58.2	68.6
K MART CORP.	685.3	1121.3
MAY STORES	680.9	574.8
J.C. PENNEY	1666.9	2679.5
SEARS ROEBUCK	652.9	616.0
WOODWARD LOTHROP	717.8	558.7
F.W. WOOLWORTH	890.0	1379.8

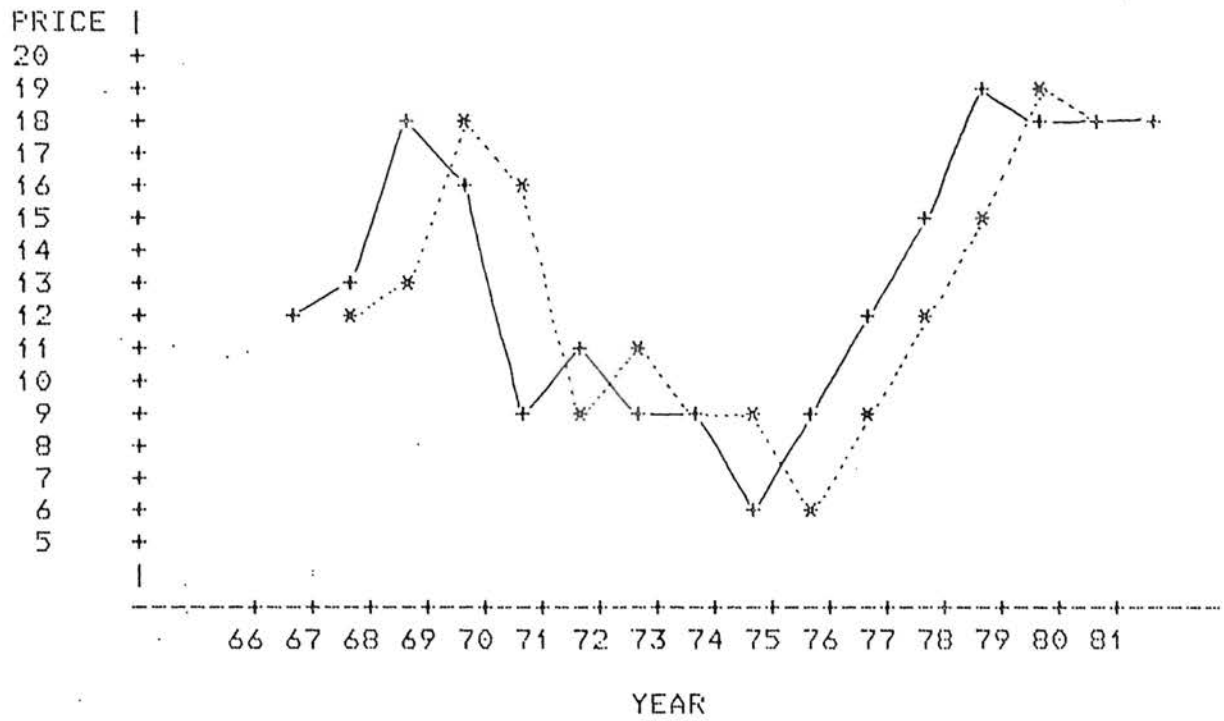

FIGURE 9.

ACTUAL VERSUS PREDICTED STOCK PRICE ($)
FOR CARSON PIRIE SCOTT & CO.

+ = ACTUAL PRICE * = MODEL I

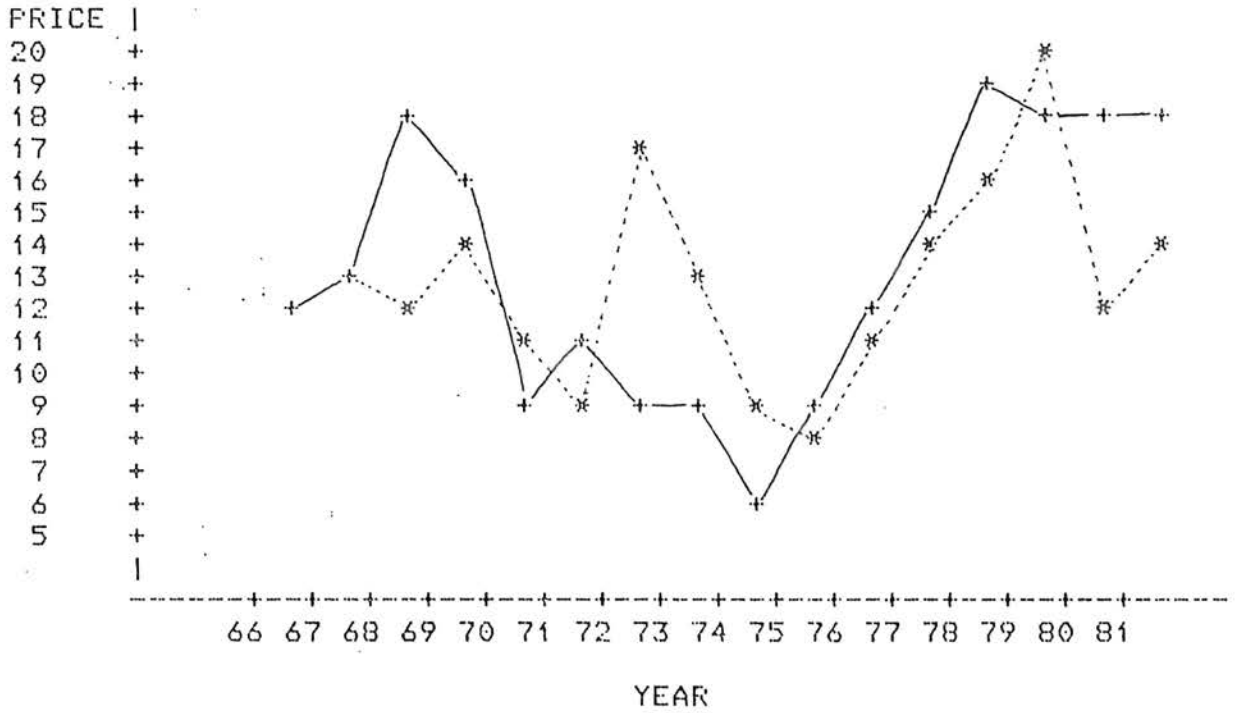

FIGURE 10.

ACTUAL VERSUS PREDICTED STOCK PRICE ($)
FOR CARSON PIRIE SCOTT & CO.

+ = ACTUAL PRICE * = MODEL II

CHAPTER 6

CONCLUSIONS

A general conclusion that emerges from this study is that management can bring about structural changes in the corporate financial planning model by adhering to simple normative or prescriptive guidelines in determining the "right" type of models that are best applicable to the firm. More specifically, the following conclusions can be drawn with regard to the models for sales, dividend and stock price prediction.

1. Sales prediction models for retail firms based on national economic parameters such as the GNP and personal consumption are easy to implement, and provide better forecasting methods than extrapolations from historical data. Sales predictions based on the national consumption of durable or nondurable goods consumed are not very accurate. However, a company may be able to enhance the predictive qualities of a model by using a combination of these variables.
2. Sales predictions based on the market share may be economically infeasible because their utility hinges on an accurate knowledge of market share.
3. In the cases studied, the dividend model that assumes

the same dividend in a year as in the previous year gives better results than the models assuming a constant payout ratio or a constant increase in dividend. This conclusion reinforces the belief that the dividend policy of most firms is unknown and unpredictable.

4. The correlations between per share price, dividend, earnings, and the interest rate are not consistent from one firm to another; therefore, no general guidelines can be prescribed for building a stock price prediction model. This does not mean that a firm cannot use "dustbowl" empiricism to build a model that suits its needs. In the absence of such a model, two simple models can be used. One model assumes no change in stock price from the previous year. The other model assumes no change in Price to Earnings ratio from the previous year. Both of these models seem to work equally well.

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APPENDIX 1

RAW DATA FOR YEARS 1966-81 OBTAINED FROM VALUE LINE INVESTMENT SURVEY. ABBREVIATIONS USED ARE:

SPS=SALES PER SHARE ($)
E=EARNINGS PER SHARE ($) D=DIVIDEND PER SHARE ($)

CS=COMMON SHARES OUTSTANDING (IN MILLIONS)
PE=PRICE TO EARNINGS RATIO

DATA FOR "ALLIED STORES CORP."

A MEDIUM SIZE FIRM

YR	SPS	E	D	CS	PE
66	70.10	1.51	0.66	14.61	9.8
67	71.18	1.63	0.66	15.24	9.8
68	72.52	1.50	0.69	16.11	14.7
69	72.63	1.32	0.70	16.55	13.1
70	72.91	0.86	0.70	16.63	14.2
71	78.00	1.18	0.70	16.82	14.3
72	87.84	1.64	0.70	16.88	10.3
73	95.77	1.99	0.71	16.69	6.2
74	100.35	2.20	0.75	15.90	4.7
75	108.19	3.45	0.78	16.22	5.3
76	94.68	3.40	0.88	18.98	7.0
77	96.67	3.81	1.05	19.74	5.7
78	102.50	4.08	1.30	20.32	5.7
79	107.70	4.41	1.55	20.52	5.4
80	112.59	4.11	1.70	20.14	5.3
81	135.08	4.38	1.75	20.23	5.9

DATA FOR "CARSON PIRIE SCOTT & CO."

A SMALL SIZE FIRM

YR	SPS	E	D	CS	PE
66	70.10	1.51	0.66	14.61	9.8
67	71.18	1.63	0.66	15.24	9.8
68	72.52	1.50	0.69	16.11	14.7
69	72.63	1.32	0.70	16.55	13.1
70	72.91	0.86	0.70	16.63	14.2
71	78.00	1.18	0.70	16.82	14.3
72	87.84	1.64	0.70	16.88	10.3
73	95.77	1.99	0.71	16.69	6.2
74	100.35	2.20	0.75	15.90	4.7
75	108.19	3.45	0.78	16.22	5.3
76	94.68	3.40	0.88	18.98	7.0
77	96.67	3.81	1.05	19.74	5.7
78	102.50	4.08	1.30	20.32	5.7
79	107.70	4.41	1.55	20.52	5.4
80	112.59	4.11	1.70	20.14	5.3
81	135.08	4.38	1.75	20.23	5.9

DATA FOR "CARTER HAWLEY HALE STORES, INC."

A MEDIUM SIZE FIRM

YR	SPS	E	D	CS	PE
66	26.74	1.09	0.53	9.33	13.4
67	42.61	1.32	0.56	10.73	13.4
68	54.04	1.34	0.59	10.73	17.8
69	58.63	1.40	0.59	10.91	16.9
70	44.11	1.36	0.63	15.01	15.0
71	46.80	1.63	0.67	16.14	17.6
72	56.13	1.87	0.68	16.59	19.5
73	61.89	2.15	0.78	16.67	14.7
74	67.30	1.71	0.80	16.67	12.0
75	64.89	2.11	0.83	19.29	10.3
76	71.09	1.97	0.90	19.29	10.5
77	76.44	2.37	0.95	19.69	7.8
78	87.65	2.52	1.00	24.15	6.9
79	95.59	2.67	1.10	25.19	6.6
80	99.20	2.11	1.16	26.54	8.8
81	99.26	1.55	1.22	28.92	11.0

DATA FOR "FEDERATED DEPARTMENT STORES, INC."

A LARGE SIZE FIRM

YR	SPS	E	D	CS	PE
66	33.86	1.77	0.84	41.60	17.5
67	38.71	1.92	0.85	43.42	17.6
68	41.74	1.85	0.93	43.45	20.1
69	45.83	1.98	0.98	43.48	18.2
70	47.99	1.89	1.00	43.58	18.7
71	53.52	2.20	1.00	43.97	21.3
72	60.20	2.46	1.04	44.27	21.0
73	66.97	2.57	1.08	44.23	15.5
74	73.77	2.69	1.16	44.31	10.8
75	83.52	3.54	1.22	44.46	13.4
76	92.52	3.50	1.39	48.06	14.0
77	102.32	4.09	1.50	48.12	9.5
78	112.13	4.11	1.63	48.20	8.6
79	120.24	4.21	1.70	48.29	7.0
80	130.14	4.54	1.80	48.41	6.3
81	145.98	5.33	1.90	48.42	6.9

DATA FOR "HECK S INC."

A SMALL SIZE FIRM

YR	SPS	E	D	CS	PE
66	3.93	0.12	0.02	5.76	6.8
67	4.82	0.14	0.02	5.81	8.5
68	4.93	0.16	0.02	6.45	14.2
69	5.72	0.23	0.02	6.88	11.1
70	7.31	0.31	0.02	7.23	10.9
71	7.76	0.37	0.03	8.16	21.1
72	9.54	0.45	0.03	8.98	20.9
73	12.22	0.53	0.04	9.08	10.9
74	14.88	0.56	0.04	9.11	4.9
75	16.44	0.58	0.05	9.19	7.3
76	19.95	0.78	0.07	9.20	6.7
77	23.88	0.87	0.14	9.22	6.8
78	29.40	1.15	0.16	9.71	6.1
79	40.52	1.53	0.19	9.72	5.5
80	44.42	1.59	0.20	9.73	6.3
81	48.61	1.37	0.23	9.75	8.4

DATA FOR "K MART CORPORATION"

A LARGE SIZE FIRM

YR	SPS	E	D	CS	PE
66	10.78	0.28	0.09	101.17	15.8
67	13.58	0.34	0.10	102.03	21.7
68	16.77	0.46	0.11	103.25	26.0
69	21.00	0.51	0.13	104.06	33.3
70	23.55	0.61	0.15	108.66	26.0
71	28.27	0.85	0.17	109.68	34.2
72	32.71	1.00	0.17	117.31	42.5
73	38.72	1.15	0.20	119.66	32.0
74	46.04	0.87	0.22	120.24	32.8
75	56.36	1.64	0.24	120.62	18.3
76	69.15	2.15	0.32	121.20	17.6
77	81.72	2.43	0.56	121.65	12.2
78	95.75	2.74	0.72	122.14	9.2
79	103.64	2.84	0.84	122.84	8.9
80	115.13	2.07	0.92	123.38	10.1
81	133.31	1.75	0.96	123.98	10.8

DATA FOR "MAY DEPARTMENT STORES CO."

A MEDIUM SIZE FIRM

YR	SPS	E	D	CS	PE
66	3.95	1.67	1.05	22.28	17.4
67	45.73	1.57	1.07	22.24	15.1
68	47.92	1.47	1.07	22.67	18.8
69	50.23	1.25	1.07	22.58	17.0
70	51.61	1.39	1.07	22.55	11.3
71	58.11	1.83	1.07	22.56	16.3
72	64.96	2.09	1.07	22.60	15.0
73	69.42	2.11	1.07	22.40	9.6
74	76.14	2.05	1.07	22.28	7.4
75	89.70	2.94	1.07	22.34	9.3
76	95.02	3.06	1.11	22.30	10.3
77	105.90	3.71	1.15	22.24	6.8
78	114.73	4.01	1.25	22.37	6.0
79	102.05	3.93	1.37	28.97	6.3
80	108.08	4.01	1.51	29.14	6.0
81	117.35	4.31	1.66	28.98	6.2

DATA FOR "J.C. PENNEY COMPANY"

A LARGE SIZE FIRM

YR	SPS	E	D	CS	PE
66	51.10	1.59	0.87	49.89	18.3
67	55.03	1.80	0.90	49.90	17.9
68	64.37	2.12	0.90	51.62	18.9
69	72.67	2.15	1.00	51.68	23.5
70	77.93	2.14	1.00	53.27	22.2
71	85.34	2.46	1.00	56.39	27.6
72	96.86	2.86	1.05	57.09	28.7
73	106.68	3.19	1.10	58.53	24.8
74	116.93	2.12	1.14	59.31	27.2
75	121.39	3.16	1.16	63.26	16.4
76	129.51	3.57	1.28	64.50	14.7
77	142.08	4.51	1.48	65.94	8.1
78	158.74	4.12	1.76	68.32	8.6
79	161.74	3.52	1.76	69.70	8.1
80	162.05	3.33	1.84	70.06	7.2
81	165.02	5.50	1.84	71.87	5.4

DATA FOR "SEARS ROEBUCK & CO."

A LARGE SIZE FIRM

YR	SPS	E	D	CS	PE
66	22.28	1.13	0.60	305.49	24.1
67	23.95	1.26	0.60	306.05	22.0
68	26.71	1.37	0.65	306.87	24.2
69	28.74	1.44	0.68	308.37	23.8
70	29.98	1.51	0.68	308.97	22.1
71	32.15	1.78	0.75	311.22	25.1
72	35.00	1.97	0.81	314.02	28.6
73	39.12	2.16	0.88	314.56	22.1
74	41.50	1.62	0.93	315.65	20.8
75	43.02	1.65	0.93	317.09	20.1
76	46.86	2.19	0.80	319.01	15.6
77	53.51	2.62	1.08	321.87	11.2
78	55.63	2.86	1.27	322.63	8.1
79	55.19	2.54	1.28	317.33	7.6
80	79.89	1.92	1.36	315.36	8.6
81	78.64	2.06	1.36	347.89	8.4

DATA FOR "WOODWARD & LOTHROP, INC."

A SMALL SIZE FIRM

YR	SPS	E	D	CS	PE
66	44.33	1.75	0.91	2.34	15.1
67	48.32	1.81	0.91	2.34	11.7
68	52.02	1.77	0.91	2.34	13.2
69	53.81	1.57	0.91	2.34	14.2
70	56.39	1.87	0.91	2.42	8.6
71	63.31	2.34	1.00	2.42	13.2
72	69.08	2.35	1.03	2.45	13.9
73	71.67	1.95	1.07	2.45	8.8
74	79.19	2.69	1.07	2.37	4.6
75	91.70	4.10	1.37	2.38	5.0
76	100.90	4.89	1.40	2.39	5.3
77	103.91	4.72	1.70	2.40	5.5
78	112.22	5.04	1.70	2.42	5.5
79	121.67	4.10	1.70	2.43	6.4
80	127.09	3.95	1.70	2.43	5.7
81	137.26	4.18	1.70	2.44	7.0

DATA FOR "F.W. WOOLWORTH & CO."

A LARGE SIZE FIRM

YR	SPS	E	D	CS	PE
66	54.46	2.34	1.00	28.89	10.0
67	57.65	2.29	1.00	28.95	11.4
68	66.45	2.29	1.00	28.70	12.1
69	78.90	2.32	1.15	28.80	15.4
70	87.61	2.52	1.20	28.86	13.1
71	95.66	2.50	1.20	29.28	19.5
72	109.88	2.60	1.20	28.65	14.4
73	130.77	3.15	1.20	28.46	6.8
74	146.62	2.14	1.20	28.49	6.3
75	161.89	3.34	1.20	28.72	5.1
76	177.70	3.62	1.20	28.99	6.5
77	190.08	3.03	1.40	29.12	7.1
78	209.52	4.34	1.40	29.13	4.5
79	228.76	6.02	1.60	29.66	4.3
80	240.59	5.30	1.80	30.00	4.7
81	238.15	2.64	1.80	30.33	8.3

APPENDIX 2

RAW DATA FOR YEARS 1966-81 OBTAINED FROM ECONOMIC INDICATORS PUBLISHED BY THE U.S. GOVERNMENT. ABBREVIATIONS USED ARE:

GNP=GROSS NATIONAL PRODUCT (B$) PC=PERSONAL CONSUMPTION (B$)
I=YEARLY AV OF 3-MONTH T-BILL INTEREST RATE (%)
D=CONSUMPTION OF DURABLES (B$) ND=CONSUMPTION OF NONDURABLES (B$)

YR	GNP	PC	D	ND	I
66	756.0	466.3	70.8	206.9	4.881
67	799.6	492.1	73.1	215.0	4.321
68	873.4	536.2	84.0	230.8	5.339
69	944.0	579.5	90.8	245.9	6.677
70	992.7	616.8	90.5	264.4	6.458
71	1077.6	664.9	103.5	278.1	4.348
72	1185.9	737.1	111.1	300.6	4.071
73	1326.4	812.0	123.3	333.4	7.041
74	1434.2	888.1	121.5	373.4	7.886
75	1549.2	976.4	132.2	407.3	5.838
76	1718.0	1084.3	156.8	441.7	4.989
77	1918.0	1204.4	178.2	478.8	5.265
78	2156.1	1346.5	200.2	528.2	7.221
79	2413.9	1507.2	213.4	600.0	10.041
80	2626.1	1667.2	214.3	670.4	11.506
81	2925.5	1843.2	234.6	734.5	14.077

APPENDIX 3.

CORRELATION COEFFICIENTS BETWEEN SHARE PRICE, EARNINGS PER SHARE, DIVIDENDS PER SHARE AND INTEREST RATES FOR ELEVEN COMPANIES SELECTED FOR THIS STUDY

ALLIED STORES CORP.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.74359	0.71061	0.41008
E	0.74359	1.00000	0.85677	0.63534
D	0.71061	0.85677	1.00000	0.86594
I	0.41008	0.63534	0.86594	1.00000

CARSON PIRIE SCOTT & CO.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.47010	0.71024	0.48061
E	0.47010	1.00000	0.63813	0.31575
D	0.71024	0.63813	1.00000	0.86306
I	0.48061	0.31575	0.86306	1.00000

CARTER HAWLEY HALE STORES, INC.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.01635	-0.32528	-0.37233
E	0.01635	1.00000	0.68913	0.24531
D	-0.32528	0.68913	1.00000	0.79542
I	-0.37233	0.24531	0.79542	1.00000

FEDERATED DEPARTMENT STORES, INC.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	-0.09831	-0.20387	-0.49704
E	-0.09831	1.00000	0.97797	0.73668
D	-0.20387	0.97797	1.00000	0.78794
I	-0.49704	0.73668	0.78794	1.00000

HECK S INC.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.77863	0.74420	0.59393
E	0.77863	1.00000	0.95822	0.78420
D	0.74420	0.95822	1.00000	0.80748
I	0.59393	0.78420	0.80748	1.00000

K MART CORPORATION

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.45316	0.09515	-0.08984
E	0.45316	1.00000	0.81217	0.43499
D	0.09515	0.81217	1.00000	0.82167
I	-0.08984	0.43499	0.82167	1.00000

MAY DEPARTMENT STORES CO.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.19364	0.05858	-0.25617
E	0.19364	1.00000	0.79852	0.65183
D	0.05858	0.79852	1.00000	0.91570
I	-0.25617	0.65183	0.91570	1.00000

J.C. PENNEY COMPANY

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	-0.20347	-0.48038	-0.45165
E	-0.20347	1.00000	0.82703	0.58502
D	-0.48038	0.82703	1.00000	0.78113
I	-0.45165	0.58502	0.78113	1.00000

SEARS ROEBUCK & CO.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	-0.15640	-0.57222	-0.65548
E	-0.15640	1.00000	0.73584	0.29325
D	-0.57222	0.73584	1.00000	0.79727
I	-0.65548	0.29325	0.79727	1.00000

WOODWARD & LOTHROP, INC.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	0.29352	0.29587	-0.04900
E	0.29352	1.00000	0.92455	0.37958
D	0.29587	0.92455	1.00000	0.62027
I	-0.04900	0.37958	0.62027	1.00000

F.W. WOOLWORTH CO.

VARIABLE	PRICE (P)	EARNINGS (E)	DIVIDENDS (D)	INTEREST RATE(I)
P	1.00000	-0.20615	-0.18400	-0.32903
E	-0.20615	1.00000	0.66040	0.46611
D	-0.18400	0.66040	1.00000	0.87011
I	-0.32903	0.46611	0.87011	1.00000

VITA

Surinder Kumar Sahai

Candidate for the Degree of

Master of Business Administration

Report: INVESTIGATIONS INTO POSSIBLE IMPROVEMENTS IN FINANCIAL PLANNING MODELS THROUGH STRUCTURAL CHANGES

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